Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2161903 Date:21/05/2019

Subject Name:Computer Aided Design

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			Marks
Q.1	**(a)**	How many bytes are used for 1 MB requirement? A raster system has resolution 1024 × 1024. Compute the size of frame buffer (in Megabytes) to store 12 bits per pixel. If a refresh rate of 60 Hz non-interlaced then find time require to display a pixel.	**03**
	(b)	Draw a block diagram of the manufacturing process of typical product cycle. Which process is the backbone of the manufacturing process?	**04**
	(c)	Rasterize pixel locations for a straight line from A(5,10) to B(15,30) using DDA.	**07**
Q.2	**(a)**	The end points of line are P_1(1, 6, 8) and P_2 (-5, 8, -2). Determine (i) Parametric equation of line (ii) Tangent vector of line (iii) Length of line	**03**
	(b)	Differentiate between analytic and synthetic curves. Explain various types of continuity used in synthetic curves.	**04**
	(c)	The end points of cubic spline curve are P_0 (1,2) and P_1(7,1). The tangent vector for end P_0 is given by line joining P_0 and point P_2 (-2,1). The tangent vector for end P_1 is given by line joining P_3 (9,-2) and point P_1.. Determine the parametric equation of Hermite's cubic spline curve Compute points on curve at u=0.2,0.5 and 0.8.	**07**
		OR	
	(c)	Derive equation of Bezier's curve with 5 control points. State the order of the curve generated by these control points. What do you mean by 'Convex hull' property?	**07**
Q.3	**(a)**	Write full form of followings: (i) OLED (ii) LCD (iii) IGES	**03**
	(b)	What do you mean by "Ortho" in Orthographic projection? Derive expression of top view of an orthographic projection.	**04**
	(c)	Derive the equations of linear shape functions. Draw a neat sketch of both shape functions. What do you mean by 'Iso-parametric formulations' of the problems?	**07**
		OR	
Q.3	**(a)**	Differentiate between Hermite's cubic spline and Bezier's Curve.	**03**
	(b)	Explain perspective projection with neat sketch.	**04**
	(c)	Derive the equation of quadratic shape functions N_1, N_2 and N_3. Draw a neat sketch of all shape functions.	**07**
Q.4	**(a)**	State any three methods used to solve structure problems using FEM. Write various applications areas of FEM.	**03**
	(b)	Explain concept of plane stress and plane strain with examples.	**04**
	(c)	Write element connectivity table and formulate the global stiffness matrix. A_1=500 mm^2, A_2=1200 mm^2 and E=200GPa for the two bar truss shown in figure 1.	**07**

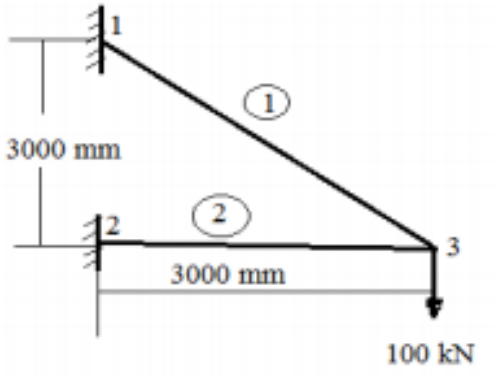

Figure 1

OR

Q.4 **(a)** What is 'Discretization'? Mention the precautions required during discretization process. **03**

(b) Evaluate the shape functions N1, N2 and N3 at the interior point P(3.85,4.8) for constant strain triangular element. The coordinates of CST are $(x_1,y_1)=(1.5,2)$, $(x_2,y_2)=(7,3.5)$ and $(x_3,y_3)=(4,7)$ respectively for nodes 1, 2 and 3. **04**

(c) Consider a bar as shown in figure 2. An axial load of 200KN is applied at point P. Take $A_1=2400$ mm^2, $E_1=70$GPa, $A_2=600$ mm^2 and $E_2=200$GPa. Calculate the following (i) The nodal displacement (ii) Stresses in each element (iii) Reactions at supports **07**

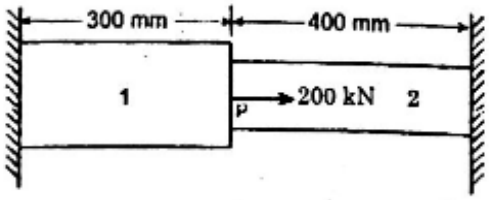

Figure 2

Q.5 **(a)** Write matrices for 2D-translation, rotation about Y-axis and scaling for object in 3D space using homogeneous coordinates. **03**

(b) Differentiate between geometry and topology. Write any four properties of solid models. **04**

(c) A triangle ABC is represented as A (12,10), B (20,15) and C (30,30). If it is mirrored about a line y= -10, determine the new coordinates of the triangle. **07**

OR

Q.5 **(a)** State various surface entities used for surface modelling. Explain surface of revolution with at least two examples. **03**

(b) What is Constructive Solid Geometry representation approach? Explain with suitable example. **04**

(c) Explain window to view port transformations. **07**

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